Electronic Supplementary Material (ESI) for RSC Advances.

Supporting information

Microwave-assisted catalytic conversion of glucose to 5-hydroxymethylfurfural using "three dimensional" graphene oxide hybrid catalysts

Yui Hirano, Jorge N. Beltramini, Atsushi Mori, Manami Nakamura, Mohammad Razaul Karim, Yang Kim, Masaaki Nakamura and Shinya Hayami

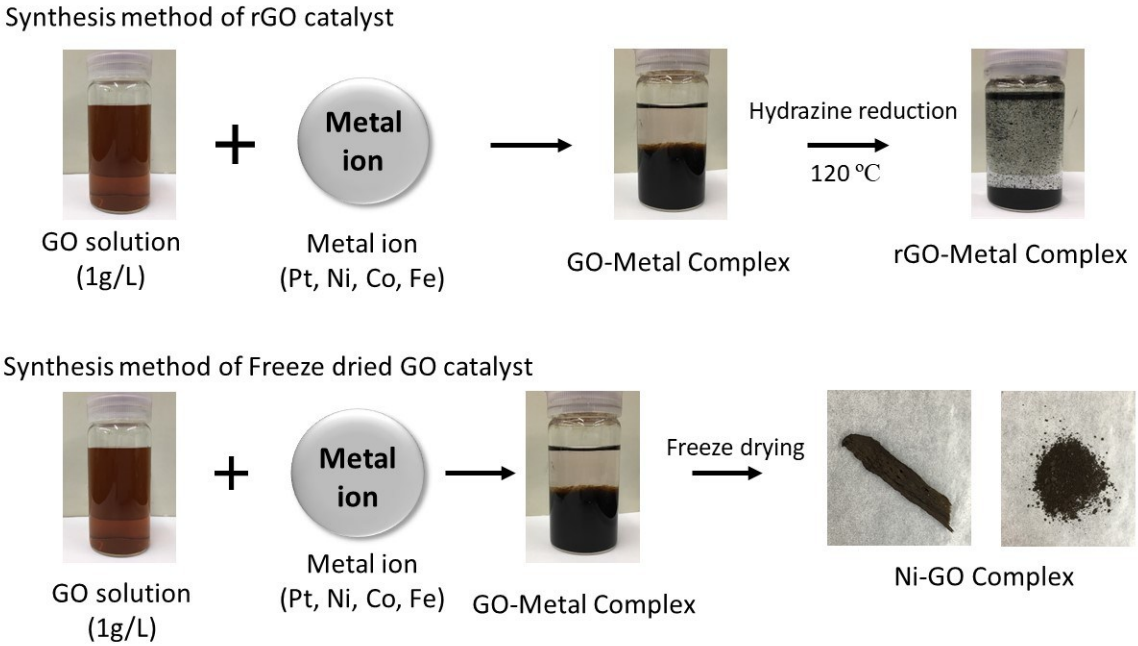

Figure S 1: Scheme for the synthesis of M-rGO and NiGO-FD

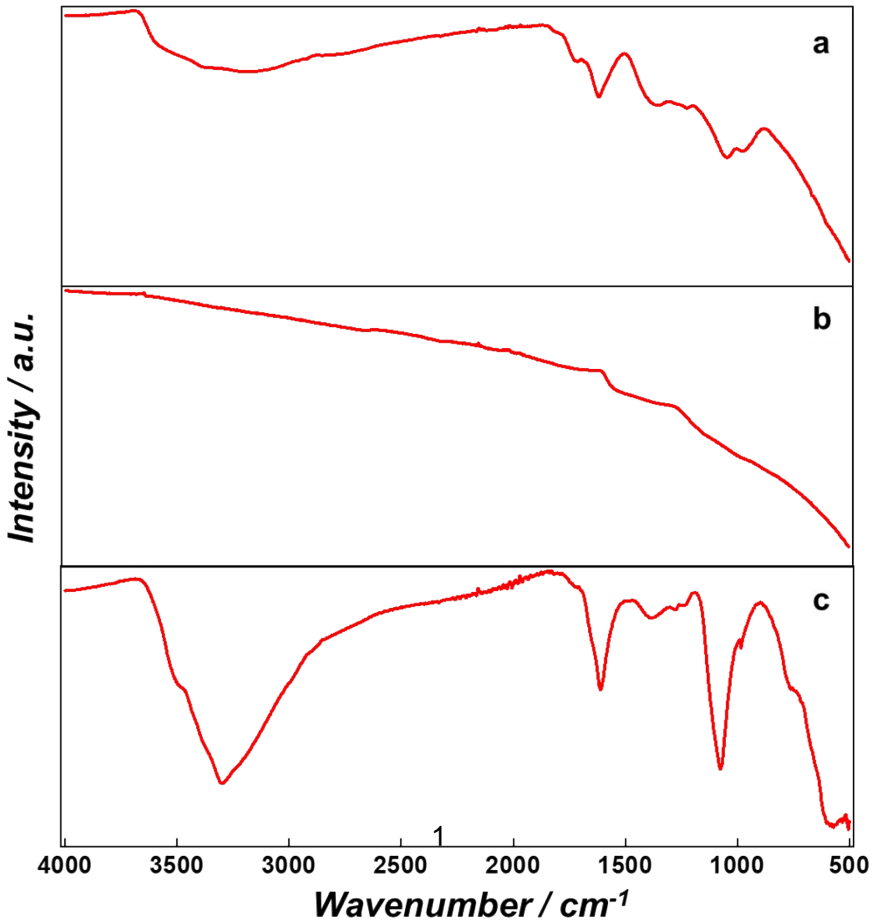

Figure S 2: FT-IR spectra for (a) GO (b) Ni-rGO (c)3D Ni-GO

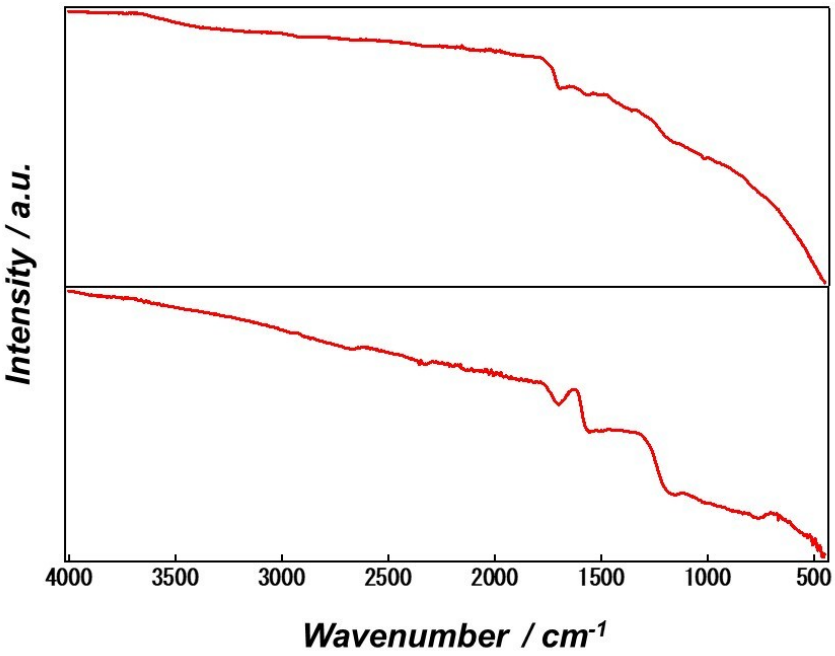

Figure S 3: FT-IR spectra for after reaction (a) Ni-rGO (b) 3D Ni-GO

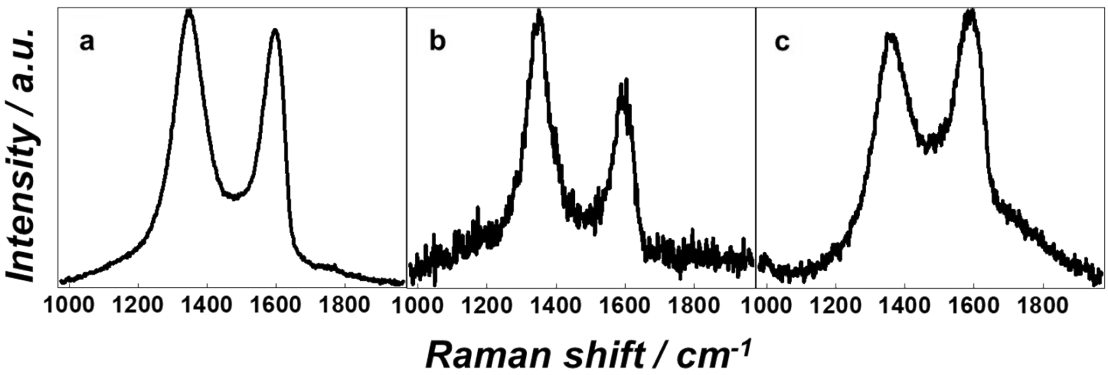

Figure S 4 Raman spectrum before reaction of (a) GO (b)Ni-rGO (c)3D Ni-GO

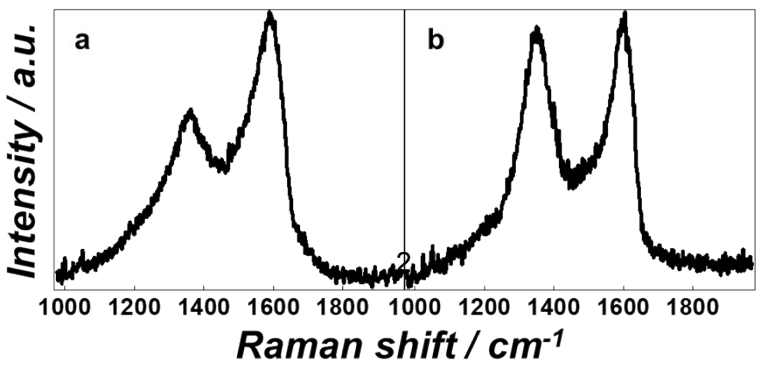

Figure S 5 Raman spectrum after reaction of (a) Ni-rGO (b) 3D Ni-GO

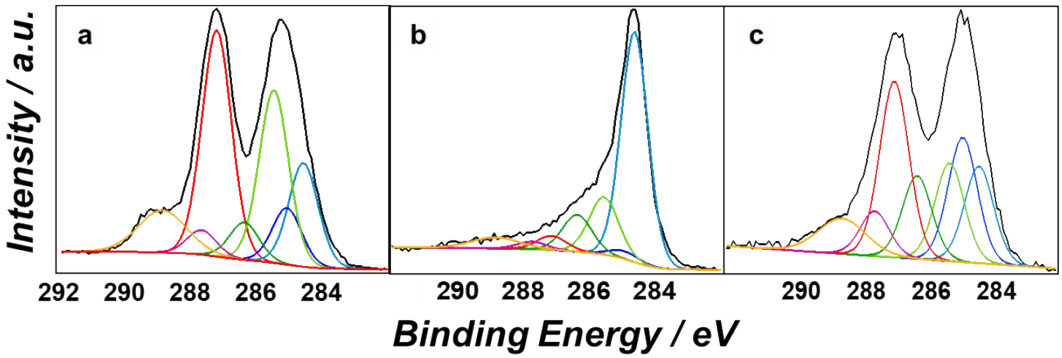

Figure S 6 XPS spectrum of the C 1s (a) GO (b) Ni-rGO (c) 3D Ni-GO

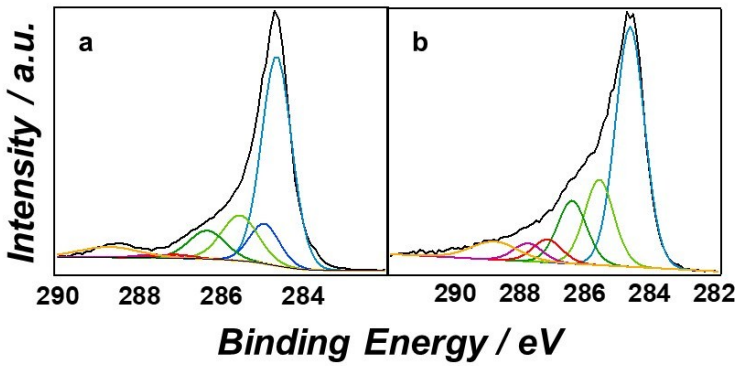

Figure S 7 XPS spectrum of the C 1s after reaction (a) Ni-rGO (b) 3D Ni-GO

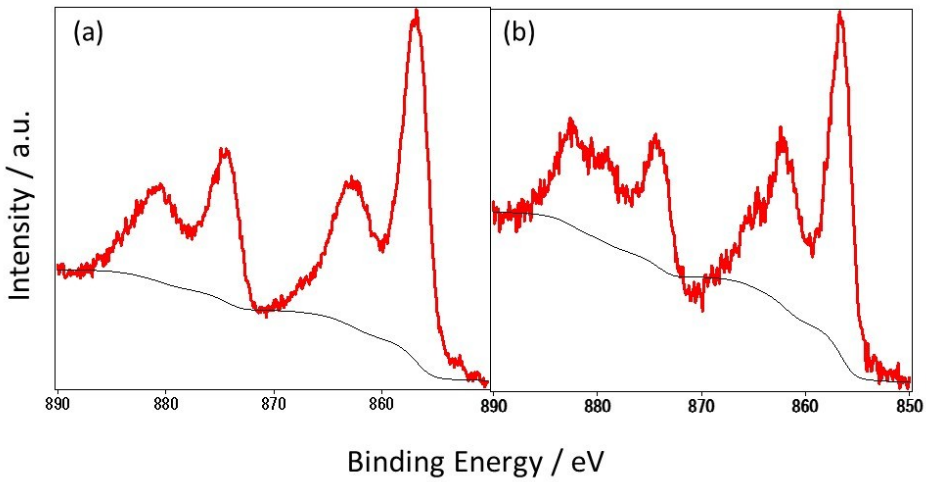

Figure S 8 XPS spectrum of the Ni 2p **(**a) Ni-rGO (b) 3D Ni-GO

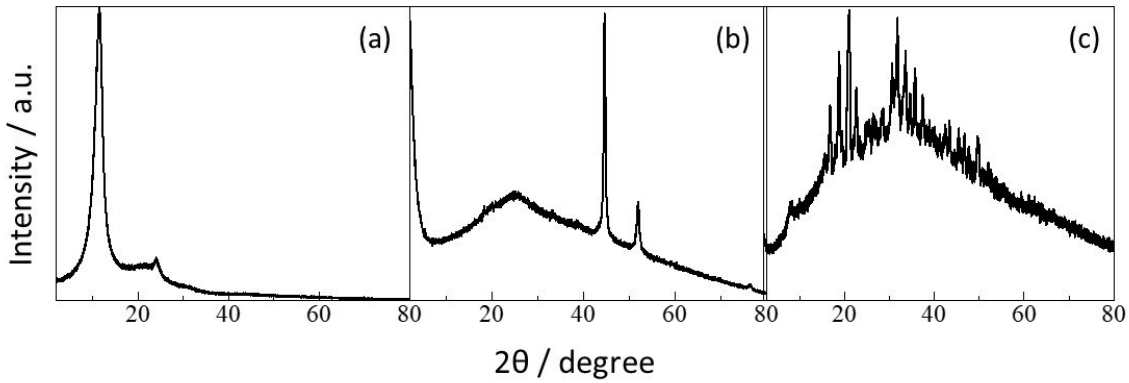

Figure S 9 PXRD before reaction of **(**a) GO (b) Ni-rGO (c) 3D Ni-GO

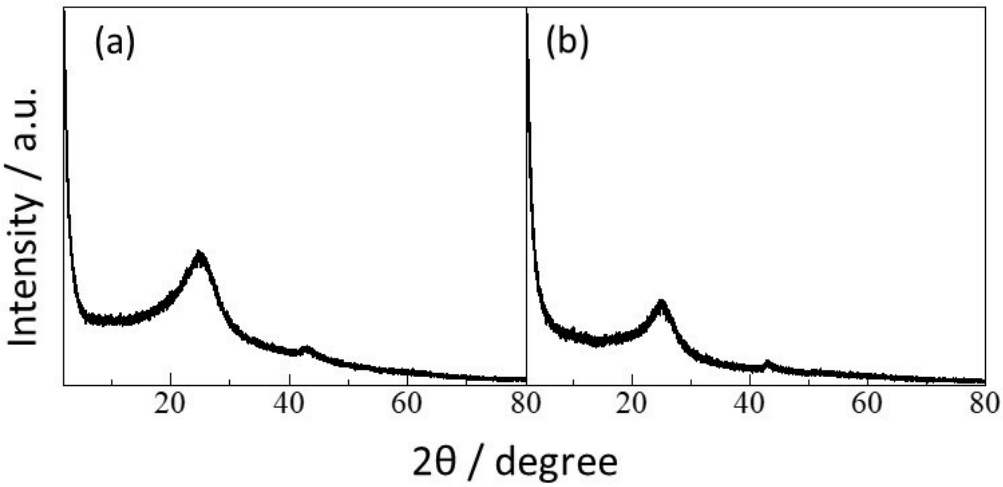

Figure S 10 PXRD before reaction of **(**a) Ni-rGO (b) 3D Ni-GO

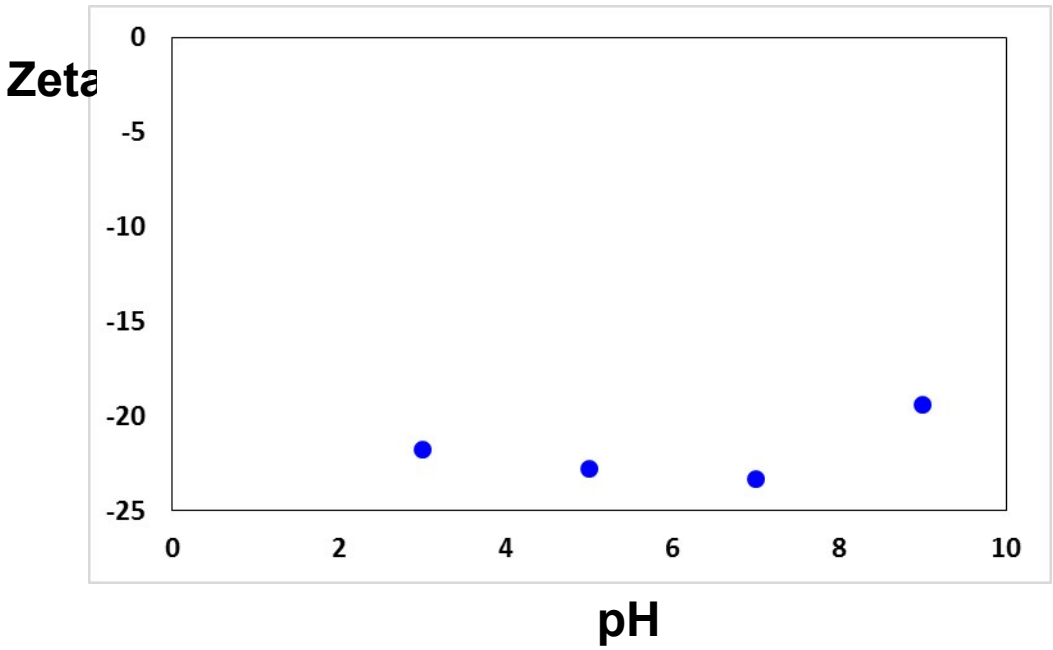

Figure S 11 pH dependent Zeta Potential value for NiGO-FD

Table S1. pH dependent Zeta Potential value for NiGO-FD

pH	Zeta Potential (mV)
3	-21.75
5	-22.79
7	-23.34
9	-19.38

Table S2. Surface acidity of the catalyst samples.

Catalyst	surface acidity (mmol)
GO	15.2
rGO	1.28
Pt-rGO	1.39
Ni-rGO	2.68
Co-rGO	2.47
Fe-rGO	1.5
NiGO-FD	9.62